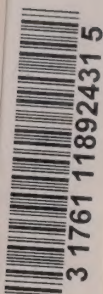


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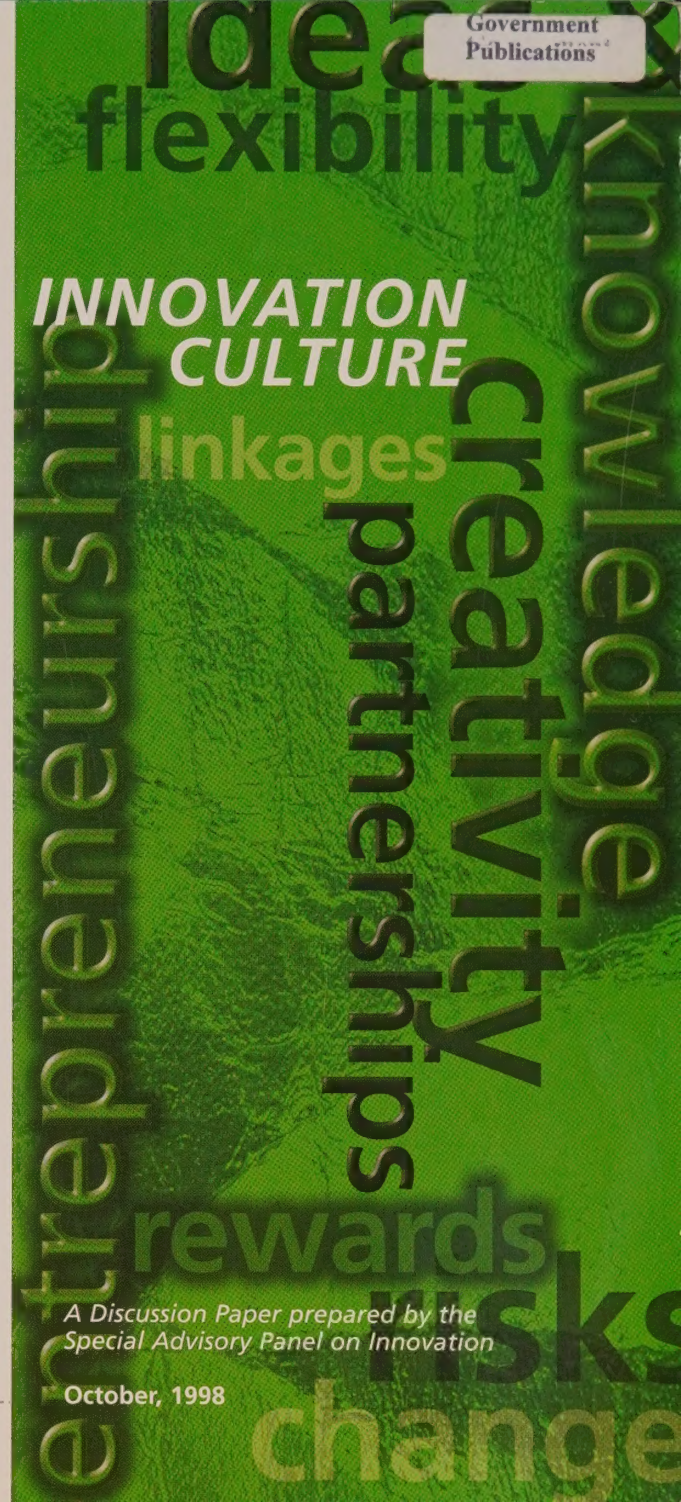
CREATING AN INNOVATION CULTURE

Key Challenges and Opportunities as Ontario Moves Ahead in the New Millennium

ONTARIO
JOBS AND INVESTMENT BOARD

*A Discussion Paper prepared by the
Special Advisory Panel on Innovation*

October, 1998



*Special Advisory Panel on
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A MESSAGE FROM THE PRESIDENT

As we approach the new millennium, Premier Harris has challenged all of us to think about our economic future.

He is optimistic about the economic future of our communities, our regions and our province in this changing global environment. We have the talent, the resources and the power to decide what kind of future we want. Together we can develop the strategies and the actions to get us there.

To meet the challenges of the global marketplace, and to seize the opportunities before us we need a road map. A road map developed together, beginning with a shared vision of making Ontario the best jurisdiction in North America to live, work and raise a family.

As Ontarians, we need not approach this challenge with fear. We should have a strong sense of confidence and optimism. Our economic and fiscal problems of the recent past are now being addressed and the results are clear. The provincial deficit is coming down. We are on track to balancing our budget by fiscal year 2000-2001. Personal income taxes, which used to be among the highest in North America, are now among the lowest in Canada. Job creation has reached historic levels. Over

370,000 net new private sector jobs have been created since June of 1995.

However, the work to date has not won us the race. We must continue to build a strong and growing economy. We must continue to create more jobs and prosperity. We are in a race that does not have a finish line. Our competitors next door, and around the world, are not standing still. All of the provinces and states around us are continuing to improve their business and investment climate.

If we wish to keep the quality jobs we now have and stimulate new growth and investment in Ontario, we must continue to improve our business climate at both the community and provincial level. We must continue to innovate and to sharpen our competitive edge. In the race for quality jobs and investment, our goal is to get out in front and stay there.

That is why the Premier has asked us to embark on this challenge. As individuals, businesses, communities and organizations from all sectors and regions of our province, we must consider the future. We must plan for the new economy. We must ensure our future growth and prosperity so we can maintain and enhance the quality of life for all Ontarians. It is only through increased jobs and prosperity that we will be able to continue to develop and finance the social programs and quality of life we all expect in our caring and compassionate society.



Ontario is one of the most export-oriented and advanced economies of the world. That is one of our strengths, but it also poses a challenge. We must recognize our need to remain globally competitive across the diverse sectors and regions of our economy. We cannot rely on a low Canadian dollar for our long-term competitive advantage. We must continually strive to improve quality and efficiency. In that way, we will keep the quality jobs that already exist in Ontario and attract new investment to our province.

In the new global environment, we must recognize that our capital – both financial and human – can migrate quickly. The critical challenge Ontario faces is to differentiate itself. That is, to rise above the crowd by creating an environment where good things are happening, where entrepreneurs and business people can grow and succeed, and where people want to live and work.

To help us develop a road map for Ontario's economic future, Premier Harris created the Ontario Jobs and Investment Board. As Chair of the Board, the Premier has asked us to develop an action-oriented economic vision and plan for the next century.

To assist the Board in its work, three special advisory panels have been created. Each panel will explore

distinct ways to build an economic vision and plan that will guide us into the new millennium.

The Board asked the panels to consider Ontario's economic strengths and weaknesses, as well as its opportunities and threats, and to seek the input of individuals and organizations across the province.

This discussion paper has been prepared by the Special Advisory Panel on *Creating an Innovation Culture* to support the Premier's Conferences on Jobs and Prosperity. These conferences will be held in regions across Ontario in the fall of 1998.

Regardless of whether you can attend one of these conferences, the Jobs and Investment Board welcomes your input and advice. Together, we will build an economic plan to prepare Ontario for the new millennium.

On behalf of the Board and our Special Advisory Panels, we look forward to hearing from you.

Sincerely,

David Lindsay
President and CEO

Ontario Jobs and Investment Board



TABLE OF CONTENTS

Introduction **4**

Ontario's Quality of Life Depends on Innovation **5**

What is Innovation? **8**

What Encourages Innovation? **10**

A Call to Action **19**

Where do we go from here? Have your say **23**



INTRODUCTION

The Ontario Jobs and Investment Board has asked the Special Advisory Panel on Creating an Innovation Culture to consider the challenges Ontario faces in creating a culture of innovation in Ontario.

The Creating an Innovation Culture in Ontario paper is one of three discussion papers prepared by Special Advisory Panels. The panels were established to provide advice to the Board as it spearheads the development of a long-term economic strategy and vision for Ontario in the new millennium.

The other two discussion papers address:

- Creating Infrastructure for Growth and Competitiveness, and
- Preparing People for Tomorrow's Jobs.

In developing this paper, the panel has focused on the key challenges and issues Ontarians face in building a culture that encourages and rewards innovation throughout the economy. Our aim is to stimulate ideas and discussion and provide useful supporting information for the Premier's Conferences on Jobs and Prosperity.

The Panel members are:

- Bill Buxton, Chief Scientist, Alias/Wavefront Inc. (Chair);
- Bryne Purchase, President of SAGES Inc., and
- Kenneth Knox, Deputy Minister, Ministry of Energy, Science and Technology.

We want to hear your views. To help you, we have provided a tear-away at the end of the Paper. You can also get in touch with us by visiting the Board web site at www.ontario-canada.com/jobgrow or by writing to:

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Creating an Innovation Culture
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Toronto ON M7A 1A1*

ONTARIO'S QUALITY OF LIFE DEPENDS ON INNOVATION

Rapid economic and technological change has defined the 20th century. Global progress has led to some social upheavals but, on the whole, has improved the quality of life for most citizens. Many people expect that the 21st century will witness an even faster pace of change. In Ontario, our key challenge – collectively and individually – is not merely to adapt to change but to anticipate it and take steps ahead of time to make the most of it. Underlying what follows is a belief that by following our current path, Ontario will – at best – maintain its position. In order to improve, it will take change to innovate – to break stride.

This discussion paper is, therefore, about innovation. Innovation can be defined in many ways depending on your perspective – student, entrepreneur, researcher, designer, inventor, artist, teacher, self-employed or employee. But, put simply, it is the ability to both generate and take advantage of new ideas and new ways of doing things. The end result is improved competitive advantage.

It could be argued that our ability to innovate depends largely on two factors:

- The people, organizations and institutions in our society and
- Our system of values and incentives and the ways they guide our behaviour, collectively and individually.

It is, therefore, an issue of culture.

Innovation can make major contributions to our quality of life.

Consider:

- *The most wealthy nations and regions of the world are the most innovative;*
- *Most new jobs depend on innovation;*
- *Innovation is a renewable source of wealth, and*
- *The status quo is not a viable option.*

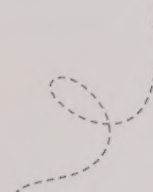
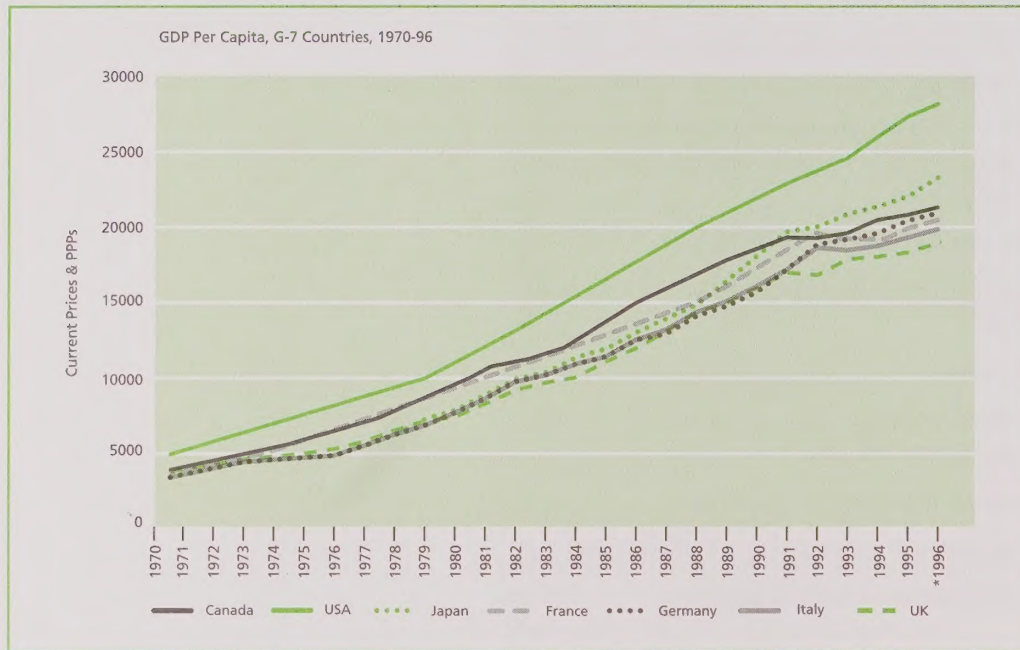


CHART 1



Source: OECD
*OECD estimate

(CURRENT PRICES AND PURCHASE PRICE PARITY (PPP), US DOLLARS)

PPP is the exchange rate between two countries that equalizes the purchasing power of two currencies for a similar basket of goods and services in each country.

THE MOST WEALTHY NATIONS AND REGIONS OF THE WORLD ARE THE MOST INNOVATIVE.

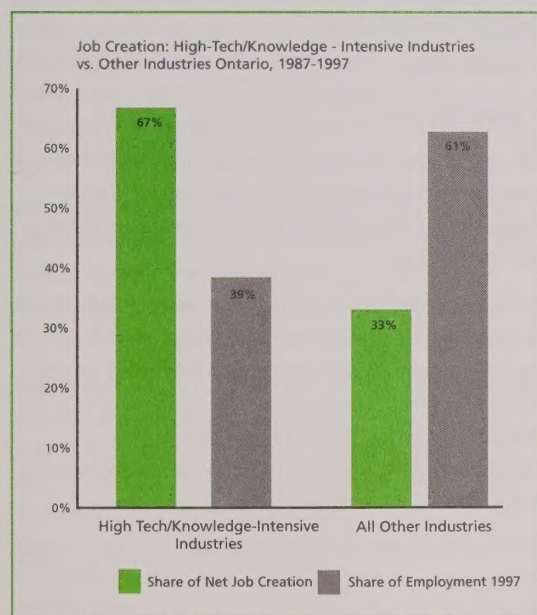
In the 19th century Great Britain was arguably the most innovative society in the world. It was also the wealthiest and its currency the strongest. The same could be said of the United States today. Canada and other nations are meeting with various levels of success as they try to catch up.

Chart 1 shows Gross Domestic Product Per Capita in the seven leading industrialized countries. GDP, a standard measure of economic strength, refers to a country's total output of goods and services. Notice that the United States (U.S.) is well ahead, and that the gap is growing between it and the other G-7 countries. Canada consistently held onto second place from the mid-1970's to the beginning of the 1990's but Canada, like the other nations, is falling more and more behind the U.S.

MOST NEW JOBS DEPEND ON INNOVATION

Chart 2 indicates that although high-tech, knowledge-intensive industries account for 39% of overall employment in Ontario, they generate more than two-thirds of new jobs in the province.

CHART 2



Source: Ontario Ministry of Finance
 Note: Commercial sector only

INNOVATION IS A RENEWABLE SOURCE OF WEALTH.

Innovation can lead to huge improvements in countless forms of human activity, such as:

- the buildings we inhabit;
- the machines we use;
- the ways we treat human illness;
- the computer programs we rely upon;
- the ways we learn, teach and communicate, and
- the ways we organize society.

By their very nature, human ideas are unlimited, and are therefore renewable sources of wealth. Traditionally, natural resources were a key factor in determining a nation's economic wealth. But as ideas have become more and more crucial in modern times, even nations with limited natural resources can become global economic leaders – as long as they can generate and apply new ideas.

THE STATUS QUO IS NOT A VIABLE OPTION

Maintaining the status quo or convention merely sustains the position of Ontario, at best.

Ontarians should be working harder to achieve new and distinct advantages over our economic competitors. This requires strength and leadership, and involves risk. But the rewards can be considerable. This document is a call to action.

"Convention, a sort of memory, is the biggest impediment to the enjoyment of life and art." Piet Mondrian, Dutch artist

We want to maximize our economic potential while minimizing risk. Success will depend on how well we can find creative solutions to our challenges. That is why it is so important to focus on building a culture of innovation.

ROOTS CANADA

While Roots is about selling high quality clothing and leather products, it is also about selling a culture and marketing concept around the world. Roots Canada has achieved worldwide recognition and has become a Canadian retail phenomenon. Co-founders Michael Budman and Don Green opened a single store selling the negative heel shoe more than 25 years ago, and it has evolved into over one hundred stores selling a complete range of products worldwide.

WHAT IS INNOVATION?

As we indicated earlier, innovation is about ideas. Ideas and processes only advance change where the culture of that society accepts the change. It is about a willingness to look ahead and think about longer-term opportunities and threats.

For the purposes of this discussion, innovation can be seen in even broader terms. Innovation:

- *refers to our ability to generate and adapt to change;*
- *applies to all human activities;*
- *involves risks, and*
- *requires collaboration.*

Innovation may apply to all human activities.

Human thought and ingenuity affects every sphere of life. Innovation influences, for example:

- agriculture;
- biology;
- health care;
- education;
- transportation;
- environmental protection;
- sports;
- arts and entertainment, and
- political institutions.

Innovation spreads to all types of business activities, including:

- management and organization;
- finance;
- marketing and customer service;
- design;
- product development;
- research, and
- manufacturing.

One of the most important business innovations has been the development of the modern limited liability corporation. It has allowed for large-scale risk taking in the private sector.

Innovation runs across all economic sectors, and affects communities of all sizes. Traditional sectors such as agriculture, mining and forestry are hugely innovative. Service businesses and sectors such as financial institutions and the entertainment industry are increasingly large investors in innovative approaches to meeting customer needs.

Innovation in political institutions has been fundamental to the growth of Western democracies. For example, innovation has spilled over into ways governments offer education, policing and consumer protection through regulations.

Innovation means generating and adapting to change

First one invents, then one innovates. One may invent or discover a new product or a new way of doing things. But, from a social perspective, innovation occurs only when this new product or process becomes widely used.

In the commercial world, the innovative product or process becomes successful when consumers use it widely such as the cell phone. Consider another example taken from the world of track and field. In the high jump, a new, back-first technique known as the "Fosbury flop" became widely imitated and led to new world records.

Innovation by its very nature involves improvements over traditional products or techniques. Sooner or later, these improvements come to be widely appreciated. Personal computers, now a frequent home and office feature, have existed since the early 1980's.

Innovations not only create new products, processes and institutions, but also destroy the status quo. The very role of innovation is to change or replace traditional ways of doing things. That is why innovation tends to face certain barriers, such as:

- lack of public knowledge;
- reluctance to accept change;
- concerns about the cost of change, and
- opposition by those who prefer the status quo.

Innovation is inherently risky.

To innovate, one must step beyond what is known and accepted by society. That is why it involves risks.

- Efforts to invent may fail or come to nothing. The experimental drug, for example, may prove under trial to have no therapeutic effect.
- Efforts to win public approval and commercial success may fail. For example, the public has been reluctant to accept irradiated foods.

The pay-off to a successful innovation can be very great. From time to time, a successful innovator becomes extraordinarily wealthy. The story of Microsoft and Bill Gates is the most spectacular in business today. Innovators in all fields have the potential to earn great fame and fortunes. But the pay-off for a successful innovation need not always be in the form of financial reward. There are also personal rewards as well as professional and community recognition and approval. The broader society and individual communities can also benefit from innovation spinoffs such as job creation and new investment.

However, unsuccessful efforts to innovate can be costly. A modern corporation can lose millions of dollars if it fails after trying to pioneer a new product. Also at stake are the possible losses of face, friends, reputation and future opportunity.

"Innovation is a social question, as much as a question of technologies."

Madame Edith Cresson,
Annual Irish Innovation Lecture, 1996

"Creativity must be nurtured; you can't wait when and if it comes along."

Mary Jane Grant, Associate Professor, Institute for Entrepreneurship, Innovation and Growth
Richard Ivey School of Business, London, Ontario
"Welcome to the Information Age." *The Globe and Mail*, October 3, 1997

"There is no reason anyone would want a computer in their home."

DEC (Digital) Chairman Ken Olson in 1977, taken from Convocation Speech by Dr. Arthur Carty, President, National Research Council of Canada
Carleton University, Ottawa Canada, June 14, 1997

"Post-it Notes were silly. (Very.) The fax machine was silly. (Very.) FedEx was silly. (Very.) CNN was silly. (Very.) The World Wide Web was silly way back in 1995."

The Circle of Innovation, Tom Peters (Alfred A Knopf, New York, 1997)



RON LASWICK – MANNING INNOVATION AWARD WINNER

The Manning innovation Awards recognize and reward Canadian innovators and have, since their inception in 1982, honoured more than 90 Canadians for their outstanding achievements and significant contribution to Canadian society. Mr. Ron Laswick of Mississauga was the 1997 recipient of the Innovation Award. Mr. Laswick, an employee of O-Two Systems International Inc., met the challenge to design a confined space rescue resuscitator for workers trapped in a toxic environment and who had stopped breathing. The small hand-held, Genesis® II IDLH Resuscitator is a simple-to-operate, automatically cycled device designed to provide pulses of air (or oxygen) to non-breathing patients. The device also allows recovering patients to breathe spontaneously, on demand. The Genesis® II recognizes the patient's inspiratory effort and halts the automatic cycling. If the patient stops breathing again, the device automatically starts breathing for the patient. A mask purge during resuscitation keeps the mask free from toxic gases.

Innovation involves collaboration.

Innovation is typically made possible by entrepreneurs who build teams with experts in areas such as invention, technique, business and finance. There are countless examples of successful entrepreneurs who use their resources and commercial abilities to team up with “smaller players” with great ideas.

JOHN SLEEMAN – SLEEMAN BREWERIES LTD., GUELPH

The company, which was started by John Sleeman's family in 1834, initially ran for 100 years. John Sleeman learned of his family's “beer heritage” in the mid 1980s, when his aunt showed him family beer recipes and challenged him to re-start the company. In 1988, John Sleeman brought back the premium brewery. Sleeman Breweries now has operations in three provinces, and sales continue to grow. As Sleeman indicated in an interview a few years ago, “What entrepreneurs are good at is planning an idea and driving an idea, but then, when their idea starts to flourish, they need to turn it over to professional managers.”

Sources: “Double-edged sword,” *Today's Entrepreneur*. Royal Bank of Canada, 1995 “One on One: The Top Things I Wish I'd Known,” *PROFIT Magazine*. Marlane Oliver, December/January 1997

WHAT ENCOURAGES INNOVATION?

Consider:

What are the incentives to innovate?

What obstacles stand in the way of achieving a culture of innovation?

AN INNOVATION SYSTEM

Innovation depends on:

- human capital (people and skills);
- organizational and physical infrastructure (corporations, schools, universities, colleges, and governments, communications systems, etc.);
- financial infrastructure (banks, investors and other sources of capital);
- legal infrastructure and civil justice system (intellectual property laws), and
- social or community capital (relationships between people and between organizations).

Innovation also rests on our culture – the values, rules, customs and incentives that govern the way we work and the way our institutions function.

In the world of innovation, culture comes down to shared attitudes, values and beliefs. It determines how well we

encourage creativity, risk-taking, entrepreneurship, and networks to share knowledge and ideas.

Culture is reflected in our behaviour, such as how we set and pursue priorities. Culture also refers to how we organize ourselves and relate to other organizations. Culture exists at many levels – corporate or service organization, sector, community, region, province or country.

Human Capital

Consider:

Creating an innovation culture is a long-term and dynamic process. How do we shape and change the ways of thinking and interacting of our youth – our future innovators?

How do we respect, build, encourage, support and reward innovation?

By world standards, Ontarians are well educated. Ontario has a higher rate of post-secondary educational achievement than any country in the Organization for Economic Cooperation and Development (OECD).

In 1997, 46% of Ontario adults aged 25 years and over had completed post-secondary education.

Skilled labour is the biggest reason why foreign-controlled multinationals (FCMNs) perform R&D in Canada, according to a survey conducted for a 1996 report on Canada's R&D position. In addition, many FCMN parent firms have internal studies demonstrating

that the cost to perform R&D in Canada is between 20% and 40% less than in areas in the United States. The cost advantage comes from lower salary costs, the Canada-US exchange rate and a variety of direct and indirect government support programs including, for example, generous R&D tax incentives.

Despite these advantages, there are concerns. Slower labour force growth and an aging workforce means that we will have to meet new needs for skilled labour by retraining current workers. The Special Advisory Panel on Preparing People for Tomorrow's Jobs raises the implications of these trends in its companion discussion paper. These trends will affect training, re-training and adjustment policies in the private and public sector.

The Preparing People for Tomorrow's Jobs Panel, also considers the implications for a growing number of self-employed people. If the movement towards self-employment turns out to be a long-term trend, it could affect the intensity of innovation by individuals and organizations.

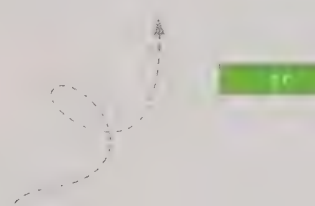
Organizational and Physical Infrastructure

Consider:

Do we have the right infrastructure in and among our schools, universities, colleges, laboratories, firms and communities?

Are they well linked through relationships, partnerships, alliances and networks?

In June 1998, the Ministry of Energy, Science and Technology, in cooperation with the Ontario Jobs and Investment Board, conducted four regional Innovation Summit meetings as part of an on-going process to determine what was needed to create an innovation culture in Ontario. The Summits were held in Waterloo, Sudbury, Ottawa and Toronto. Although each region had its own concerns, a number of common issues and opportunities emerged from the Summits.



NILSON GUIGUER – WATERLOO HYDROGEOLOGIC INC.

When Nilson Guiguer left Brazil in 1987 to get his Ph.D., he didn't dream that 10 years later he would be running a multimillion-dollar, Canadian-based groundwater modeling company with an office in Chile. Waterloo Hydrogeologic Inc. has a staff of 32 and is continuing to expand through the development of joint ventures in France and Japan. The company is a spin-off of the work Guiguer performed with support by the Centre for Research in Earth and Space Technology (CRESTech). Municipalities and others use the company's software to model groundwater flow and the movement of contaminants such as farm chemicals in the groundwater.

CRESTech is one of four Ontario Centres of Excellence. The Centres were designed to make the connection between the best university research and the needs of Ontario industry.

Innovation Summit Participants said that Ontario needs stronger ties between venture capital groups and leading researchers and scientists in universities and in the Centres of Excellence.

What can we do to help Ontario companies outperform their competitors?

How can Ontario's innovators connect better with venture capitalists, management and marketing consultants, business associations and research universities?

Ontario has many major research organizations and universities and colleges, including some of the best in the world.

Among 46 institutions, there are:

- 25 colleges of applied arts and technology;
- 17 universities, and
- a number of specialized, university-level institutions.

Some of Ontario's leading research institutes include:

- the National Research Council, and
- Ontario's four Centres of Excellence: the Centre for Research in Earth and Space Technology (CRESTech), Communications and Information Technology Ontario (CITO), Materials and Manufacturing Ontario (MMO), and Photonics Research Ontario (PRO).

Successful firms invest more in "soft" assets such as R&D and intellectual capital. Among the world's 200 largest R&D performers, the only Ontario-based company is Nortel. Ranking 28th on the list, Nortel is a highly successful world-class innovator, and a huge R&D performer. The emergence of more powerhouses such as Nortel would have a significant impact on Ontario's economic growth potential.

Successful countries generally invest more in research and development than others do.

According to the Organization for Economic Cooperation and Development:

- \$13.1 billion, or 1.66% of Canada's GDP, goes to R&D (1996).

According to Statistics Canada data:

- \$6.5 billion, or 2.1% of Ontario's GDP, goes to R&D (1995).

The Conference Board of Canada notes that technology has a decisive impact on economic productivity and performance. But the Board goes on to say that small and medium-sized enterprises in Canada appear to be weaker at adopting new technology than their U.S. counterparts. Take for example:

- half of Canadian firms with 20 to 99 employees use at least one advanced technology
- 67% of U.S. companies of the same size use at least one advanced technology.

To complicate matters, Canadian companies tend to use relatively less expensive and less productive technologies than their American counterparts.

Within Canada, Ontario leads the way in the use of new technology. Ontario manufacturers tend to adopt technology and use it in more complex ways than their counterparts in other provinces.

Ontario has become a hot spot for thousands of relatively small but fast-growing, innovative firms that could become tomorrow's corporate giants. These so-called Innovative Growth Firms create valuable jobs and keep Ontario on the cutting edge of new technologies. And they:

- *force competitors to become more innovative;*
- *stimulate customers and suppliers to upgrade;*
- *penetrate foreign markets and pave the way for other firms, and*
- *are positioned to show corporate leadership and to improve overall, sector-wide business prospects.*

To appreciate the significance of these innovative growth firms, picture not only what they are doing today but also what they could become tomorrow. Consider examples of Ontario-based companies that used to be small not very long ago:

- COM DEV International;
- Newbridge Networks Corporation;
- Royal Group Technologies Ltd., and
- Magna International Inc.

Innovative firms learn from each other. The Innovators Alliance is a new initiative created by the Ontario government and the private sector to accelerate the growth of innovative growth firms in Ontario. The Alliance helps firms connect with each other and with business service providers. This helps them address common issues and explore new business opportunities.

Too few of Ontario's promising innovative companies manage to make the transition to medium size and then go on to become large, global players. Compared to American competitors such as California, Ohio, Michigan, Pennsylvania and Massachusetts, Ontario has a smaller share of firms in the mid-size (100-499 employees) and large size (500 plus) categories.

Legal and Financial Infrastructure

Consider:

What improvements do we need to make to access to financing and our system for protecting intellectual property to encourage and support innovation?

The ways that we reward risk affect our capacity to innovate. For example, knowledge is a unique type of commodity, what economists would call a pure public good. Any number of others can easily acquire and reuse the ideas. As a result, the creators may not get a full pay-off from their original creation. This can discourage new investments and new products. To ward off this problem, inventors and entrepreneurs can apply for patents and trademarks to protect their products from imitation.

However, giving a company the sole right to produce a specific good can also inhibit the benefits to society gained from open and widespread access to knowledge. That is why patents, for example, are temporary.

JOHN KELLY, PRESIDENT AND CEO, JETFORM CORPORATION, OTTAWA AND CHAIR, INNOVATORS ALLIANCE BOARD

JetForm has developed the software for a paperless form world and this Ottawa-based firm is leading the charge into the world of electronic forms. Between 1993-98, JetForm's average annual growth rates were 66% in sales and 56% in employment. Employment is expected to grow to 725 jobs and sales to \$110 million in 1998. Its technology allows for "e-forms" to be produced for 20% of the cost of paper forms.

Innovation Summit Participants said that early-stage financing is critical. New and emerging companies have trouble getting the funding they need to convert ideas into marketable goods and services.

Our international and national system of protecting intellectual property remains far from perfect, and has sparked frequent debate. “Innovations” related to our intellectual property laws and legal system need to keep pace with changes throughout the economy.

Access to financial capital is key to innovation. The tax system, also, can have a positive impact. Ontario's tax incentives for R&D are among the most generous in the world. However, our R&D tax credits are largely directed at only one part of the innovation process. They may not provide incentives for many other innovative activities that can generate wealth.

Small business groups have recommended various ways to improve access to capital and encourage innovation:

- create an environment that encourages more financial institutions and other private sector sources to lend money to small business;
- encourage new private sources, and more financial institutions, to lend to and invest in small businesses;
- reduce regulatory barriers and the costs they create for small business, and
- continue to cut taxes.

Community and Social Capital

1) Communities, Networks and Risk Reduction

Consider:

Where in Ontario are innovative attitudes and values apparent? What can we learn from them?

Industries tend to cluster in certain geographic locations. Clustering helps companies reduce risks by creating communities of workers and suppliers that meet their needs.

When it comes to financing ideas, lenders tend to be hesitant because they have few hard assets to seize in case of a business failure. Clustered economic activity allows people and organizations to develop track records that become well known to others in the community. These track records are critical to one's ability to attract the financing necessary to develop new intellectual properties. Clustering can also give employees, as well as those who are self-employed or entrepreneurs, some security in their job or work choices; for example, the option to move to another company or employer is enhanced when you have developed a track record within that cluster of companies. Good track records help entrepreneurs and innovators overcome these barriers.

The concentration of business activity in a certain geographic area attracts new competitors and suppliers. Ottawa's Silicon Valley North is populated with firms

tracing their heritage back to Bell Northern Research and Computing Devices, just as a new generation of companies have spun out from Newbridge Networks. Another example includes a cluster of digital media companies that have located or spun out of the Toronto area (Kitchener/Waterloo and Ottawa also have pockets of digital media activity). The estimated 400 interactive digital media companies operating in the province already employ about 8,000 people and have significant potential for growth.

Communities, both large and small, can take advantage of sound economic environments at the provincial and national level to shape their own economic destinies. Community development is a bottom-up process, which requires that individuals and organizations come together to focus on the future and to provide the leadership needed to chart a road map for the future.

Successful communities assess their strengths and weaknesses, make the most of opportunities, and confront challenges. They identify the actions and capabilities required to meet their job creation and development potential.

Much attention has gone to communities that have bred manufacturing and high-tech clusters. But communities can also excel at their own forms of innovative economic development.

- Cobourg has used its historic buildings and lakefront to attract film and television production;

- Elora has become a popular tourist destination by offering a historic setting, the natural beauty of the Elora Gorge and Elora Mill, and the entertainment of the Elora Festival;
- Niagara-on-the-Lake and surrounding communities have built on their natural and commercial strengths to develop an area known for wineries, fine dining, historic landmarks, parks, and entertainment;
- Sault Ste. Marie's gateway project is looking to build on it's international border crossing location to attract new tourism investment, and
- Kitchener-Waterloo hosts North America's largest Bavarian festival in a nine day celebration of Oktoberfest.

Geographic clustering can improve competitiveness and innovation. Even physically isolated companies and communities can benefit, thanks to increasingly sophisticated technology and telecommunications. Every day, companies in remote and aboriginal communities are finding themselves less remote – and more able to participate in the knowledge-based economy. Doing business electronically has become very widespread, touching virtually all sectors ranging from bank services and food service operators to booksellers.

In The Circle of Innovation (Alfred A. Knopf, New York, 1997), Tom Peters argues that "distance is dead . . . It means that services as varied as car design, home security, and healthcare delivery will be (already are) as exportable as VCR's or automobiles."

Innovation Summit Participants said that partnerships are critical, especially those involving companies, colleges and universities. It has become increasingly important for research to bridge distinct but related interests in business, social sciences and the humanities.

Clustering also tends to promote better dialogue between colleagues, competitors and professionals. As the physicist Isaac Newton once said, "I stand on the shoulders of giants." People who push the boundaries of human thought and accomplishments always borrow from and build on the work of their colleagues, and the people who have gone before them.

2) Innovation and the Renaissance Community

Consider:

How can cooperation and collaboration within and among organizations be encouraged and strengthened to create an innovation "infrastructure"?

Innovation works best when people with different knowledge, skills and perspectives are brought together to tackle challenges. These "renaissance" teams can be created within organizations, firms and in geographic communities.

Highly functional networks in communities also benefit from the interaction of various skills. For example, bringing a new invention to market requires:

- creative thought;
- scientific ability;
- financial skills;
- marketing work, and
- customer acceptance.

This combination of business skills is what panel member Bill Buxton calls the New Multiculturalism.

Of course, the importance of networks in the geographically based community extends beyond individuals to organizations, both public and private. For example, it is well-documented that "innovative communities" foster close ties between universities, colleges and private sector research organizations.

UNIVERSITY OF OTTAWA HEART INSTITUTE
Bringing expertise of science, clinicians, business and government together is the reason why the Canadian Artificial Heart Program stands as an example of technology development and innovation at work at the University of Ottawa Heart Institute. The ventricular assist device (VAD) and related technologies were transferred to a startup company for manufacturing and commercialization (WorldHeart Corporation) in return for research support, a royalty stream and an equity position in the company. The spin-off corporation now has over 65 employees with the potential for many more if WorldHeart is successful in commercializing the technology.

Source: Ontario Ministry of Health

Similarly, private companies sometimes develop collaborative linkages or networks.

MORRISON LAMOTHE INC., OTTAWA
Morrison Lamothe Inc. was named one of Canada's Best Managed Private Companies in 1997. With 250 employees and annual sales of \$38 million in 1997, this frozen foods business in Ottawa recognized that working together with other medium-sized Canadian frozen food processors to form the Frozen Network helped position these companies as North American players versus individual competitors against much larger US companies. Some argue that, in North America, the leading edge for frozen foods is now Toronto and the difference is innovative solutions to change by Canadian retailers.

Source: "Canada's 50 Best Managed Private Companies" by Rod McQueen, *Financial Post*, December 13, 1997

Culture

1) Necessity Is the Mother of Invention: Cultures Are Products of the Environment

Consider:

How do we create an environment at the firm, organization and community levels that rewards those who take risks and those who look for new and more effective ways of doing things?

Innovation results from thought followed by action. It depends in part on the personal abilities of the leading innovator. But innovation is also affected by the environment – where we live and work.

Culture reinforces the behavior and strategies we require to succeed in any given environment. But environment dictates culture, too. If we live in a business environment that favours innovation, then such behaviour will become prevalent. There is an old saying, which goes: “Necessity is the mother of invention.” The more demanding the environment in certain respects, the more likely the organization or individual is to respond innovatively.

Examples abound in Ontario and Canada. The difficulties associated with finding, extracting, processing and transporting Ontario's natural resources spurred high levels of invention in the resource sector. As the following examples show, there is evidence that tough environmental regulations can stimulate innovative solutions.

Competition creates a demanding environment.

Knowledgeable customers armed with a choice of suppliers tend to force companies to innovate. Each competitive environment tends to foster its own type of innovation culture. For example, one would expect to find different corporate cultures in moving from a logging company to a software firm.

By contrast, companies that enjoy monopolies – the right to be the sole supplier of a given good or service – have few built-in incentives to innovate. Recognition of this fact has led to ending certain monopolies, which in turn has resulted in increases in productivity, performance and improvements in service to customers.

2) Cultures Are Deeply Embedded In the Social Infrastructure

Consider:

Can we create a culture in Ontario that views innovation, entrepreneurship and risk-taking with the same spirit, curiosity and enthusiasm found in our hockey system?

Canadian hockey is an example of how various elements of a system come together for our collective benefit. It is highly unlikely that any given child will make it to the National Hockey League (NHL). And many risks are involved in making the effort. Nevertheless, millions of Canadians – children and parents – buy into the dream of a professional hockey career. Why?

TELEMINING

INCO Ltd., a world leader in telemining, uses advanced technologies, including underground communications, positioning, process engineering, monitoring and control systems to operate mining equipment and systems remotely. Operators remain on the surface, protected from the harsh and potentially dangerous underground environment, while continuing to work productively to extract valuable ore.

CLEANER AND MORE EFFICIENT GOLD PRODUCTION IN RED LAKE

Faced with tough new regulations, Placer Dome North America Ltd. installed an innovative new pressure oxidation process at its Campbell Mine in Red Lake in 1994. The process is not only environmentally friendly – meeting all MISA (Municipal-Industrial Strategy for Abatement) and other requirements but also put an end to 50 years of problems with arsenic effluent – it actually results in the recovery of more gold than earlier methods.

Source: Ontario Ministry of Northern Development and Mines

Change Ideas & Goals

Innovation Summit Participants said that if we want to promote innovation, we must start in the schools.

- they believe in the dream;
- they share the dream, and
- a highly effective system supports the pursuit of the dream.

The hockey development system selects and nurtures young talent. Individual skills and attitudes are extensively documented. The ultimate prize is clear – a handsome contract and the recognition of playing in the NHL. The system is fully supported by the broader community made up of local, provincial and national organizations and associations. It is embedded in our culture. Hundreds of thousands of players are involved and success requires near total dedication to the goal.

Our hockey system mirrors many of the requirements of innovation:

- It is a high-risk endeavour;
- It involves many people with different skills;
- Its values are internalized by people at a very young age;
- Individual track records count for a great deal;
- It enjoys major support from the community, and
- It actually becomes part of the fabric of our culture.

A CALL TO ACTION

Consider:

How will we know that Ontario is getting better at creating a culture of innovation?

What are the current indicators for measuring our performance and activities? Are they the right indicators?

What is the role of government in helping to build an innovation culture and economic environment? How can the different levels of government work better together to stimulate innovation?

What can we learn from other jurisdictions?

Ontario accounts for 41% of Canada's gross domestic product. It is Canada's industrial heartland, and its most diversified economy. Ontario is a major trading jurisdiction, and depends heavily on international trade and investment.

The Ontario Government has focused on the quality of our business environment by taking various steps:

- tax reductions;
- moving clearly toward balancing the budget, and
- eliminating red tape and needless regulations.

Ontario's fundamentals are sound and provide a positive environment for future growth:

- strong job creation;
- sustained GDP growth;
- low interest rates;
- low inflation;
- increased consumer spending;
- more business confidence;
- more demand for housing, and
- increased exports.

We have to recognize and respond to areas of weakness. For example, the World Competitiveness Yearbook gives Canada poor marks in certain key areas, including: science education, overall productivity growth and entrepreneurship.

Ontarians still face many economic challenges.

- our export success is in part due to the weak Canadian dollar, and
- our R&D, while the best in Canada, still lags behind competitors such as Michigan, Massachusetts, Pennsylvania and California.

RECENT INITIATIVES

Over the last number of years, Ontario has initiated a number of measures to support innovation or address barriers to innovation including:

- the R&D Challenge Fund promotes business-university partnerships and research excellence;
- renewal of the Ontario Centres of Excellence program;
- Business Research Institute Tax Credit and Ontario New Technology Tax Incentive;
- Computer Animation and Special Effects Tax Credit, Digital Media Tax Credit, Enhanced Film Tax Credit, Publishing Tax Credit and Sound Recording Tax Credit;
- Sheridan College Centre for Animation and Emerging Technologies;
- Access to Opportunities Program that will enable twice as many students to enroll in computer science and high-demand engineering programs;

RECENT INITIATIVES

- *extending the Telecommunications Access Partnerships program by investing \$30 million over the next three years;*
- *\$30 million in strategic skills investment including \$10.9 million for four projects that will enhance strategic skills, including advanced training in automotive parts design and manufacturing technology, new media skills training, telecommunications training, and metal machining and engineering, and*
- *the Wisdom Exchange, an annual, one-day forum to explore issues, opportunities and barriers faced by fast-growing innovative companies.*

We need to identify and deal with impediments to innovation, including:

- lack of skilled workers;
- lack of information on, and access to, technologies;
- lack of information on markets;
- lack of technology assessment and business support-services;
- barriers to inter-firm cooperation;
- barriers to business, labour and government cooperation;
- barriers to university/college and business cooperation;
- lack of access to financing, and
- lack of a corporate or community culture that values innovation.

A More Demanding Environment

The global economy continues to become an ever more competitive and demanding environment. Trade liberalization increases the number of global competitors for products and the number of countries competing for foreign direct investment. The increasingly competitive international market for scientists, engineers and

computer animators, just to name a few examples, is giving rise to concerns about the “brain drain” and its long-term consequences. In some sectors, investment tends to follow top scientists and researchers or skilled workers – which makes it harder for us to attract and keep them.

Worldwide, consumer expectations are increasing, as they demand more sophisticated and customized products and services. New technologies are shortening product life cycles and forcing companies to respond faster. Companies must have the capacity to quickly apply new technologies. Companies will also be challenged to keep abreast of market trends and leading-edge technologies around the world.

Others Aren’t Standing Still

Ontario is not alone in trying to figure out how to encourage and reward innovation. Many other jurisdictions have identified innovation as the key to competitiveness and are attempting to improve their innovative capacity. In the 21st century, the ability to innovate will separate the economic leaders from the rest of the pack. Advanced world economies know this and are seeking ways to use knowledge to create competitive advantages and a platform for further job creation and investment.



UNITED KINGDOM

- In March 1998, The Department of Trade and Industry, U.K released a budget consultation document entitled "Innovating for the Future: Investing in R&D."
- The paper indicates that businesses and employees are key in improving investment in innovation and R&D. Government can play a role in strategic partnership with business to improve understanding of importance of innovation and R&D to long-term growth; identify barriers to R&D investment; ensure relationship between industry and science and engineering is strong, and review the regulatory, accounting, and taxation instruments.

MASSACHUSETTS, UNITED STATES

- Massachusetts has developed a strategic plan for the state with a focus on a high standard of living, job growth, and strong regional economies within the state, broad economic opportunity and a good quality of life.
- Some specific elements include a better business cost climate, promotion of advanced management approaches and manufacturing methods for small and medium sized manufacturing firms, and more efficient mechanisms for technology transfer from university to government laboratories.

PENNSYLVANIA, UNITED STATES

- Technology 21 provides a blueprint for making Pennsylvania a world leader in the new economy.
- Some of the recommendations include: identifying for attraction or expansion "anchor" firms; "gap" venture capital financing through a public/private fund privately operated; technology-ready workforce; integrated and collaborative network of statewide technology service

providers and establishing a research and technology network among research institutions, state systems and universities.

IRELAND

- The economic turnaround in Ireland has been described as "The Irish Miracle" and has been driven by a vision of Science, Technology and Innovation being the cornerstone to build international economic competitiveness and a focus on raising the skills profile of the people of Ireland.
- A National Science Advisory Council helps ensure that public investments are prioritized, planned and coordinated.

MANITOBA, CANADA

- Through the Economic Innovation and Technology Council (EITC), Manitoba produces a yearly "State of Innovation Report". The EITC is made up of business and community leaders and acts as a catalyst for partnerships and alliances for increased economic development and innovation.
- Manitoba has reviewed issues related to the problems with measuring innovation and developing appropriate benchmarks for innovation.

SINGAPORE

- Singapore has launched an integrated national plan to promote innovation. Its National Innovation Framework for Action (NIFA) is a multi-agency effort and calls on companies to "innovate or evaporate".
- Singapore has made substantive investments in building its infrastructure to support innovation and R&D activities focusing on technology knowledge, physical and innovations support infrastructures.

NOTES

This image shows a single sheet of white paper with horizontal blue or grey ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

WHERE DO WE GO FROM HERE? HAVE YOUR SAY

In this increasingly open and competitive international environment, the ability to take advantage of opportunities and adapt to change is becoming even more important in creating the valued-added, knowledge based economic activities we need to compete in the new millennium. Our ability to raise our living standards depends on improved productivity and our ability to maximize innovation throughout the economy in our organizations, communities, companies and governments.

Whatever we decide, the challenge of a truly innovative "innovation policy" is simply this: it will never be enough to do what we have always done, or simply to copy what others are doing.

Creating an innovation culture is a long-term and dynamic process. How do we shape and change the ways of thinking and interacting of our youth – our future innovators?

How do we respect, build, encourage, support and reward innovation?

What are the incentives to innovate? To speed up innovation? Are there barriers that are obstacles to achieving a culture of innovation?

Where, in Ontario, are innovative attitudes and values apparent? What can we learn from them?

Please detach and send
your responses to:
Ontario Jobs and
Investment Board
Suite 4340, Whitney Block
99 Wellesley Street West
Toronto, ON M7A 1A1
or
e-mail us at
ojib@gov.on.ca



How do we create an environment at the firm, organization and community levels that rewards those who take risks and those who look for new and more effective ways of doing things?

Do we have the right infrastructure in and among our schools, universities, colleges, laboratories, firms and communities? Are they well linked through relationships, partnerships, alliances and networks?

What improvements do we need to make to access to financing and our system for protecting intellectual property to encourage and support innovation?

How can Ontario's innovators connect better with venture capitalists, management and marketing consultants, business associations and research universities?

What is the role of government in helping to build an innovation culture and economic environment? How can the different levels of government work better together to stimulate innovation?

How will we know that Ontario is getting better at creating a culture of innovation?



*The Ontario Jobs and Investment Board was established
to develop an economic vision and strategies for
Ontario in the New Millennium.*

Mike Harris
*Premier and Chair of
Ontario Jobs and Investment Board*

Ernie Eves
Deputy Premier and Minister of Finance

Dave Johnson
Minister of Education and Training

Al Palladini
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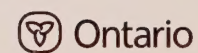
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